

## NOTES ON WEATHER IN OTHER PARTS OF THE WORLD.

*North Atlantic Ocean.*—Boston, November 22.—An iceberg in the steamship track east of Newfoundland was reported in a wireless dispatch to-day. The appearance of ice in mid-Atlantic at this season is unusual \* \* \*.—*New York Evening Post*, November 22, 1920.

*British Isles.*—During the greater part of November the British Isles lay on the western edge of a continental anticyclone, and under these conditions the month for the most part was a fine one. During the first week, however, and from the 20th to the 24th, sharp frosts occurred at many of the inland stations. The minimum temperatures recorded during the second of these cold spells were lower than any recorded this season. \* \* \* The general values [of the rainfall expressed as a percentage of the normal] \* \* \* were England and Wales, 49; Scotland, 106; Ireland, 110 \* \* \*.—*Meteorological Magazine*, November, 1920, pages 258-259.

*France.*—Paris, November 8, 1920.—There was a "rain of blood" upon Monte Carlo and Mentone on Saturday night. The downpour began about 6 p. m., accompanied by a strong southeast wind, and when it

ended an hour and a half later the roofs, roads, gardens, and luxuriant shrubs of the Riviera were covered with sticky crimson.

The scientific explanation is that the rain clouds had been saturated with red sand from the Sahara Desert \* \* \*.—*The New York Times*, November 9, 1920.

*Morocco.*—Tangier, November 29.—Many persons lost their lives in a waterspout which yesterday laid waste some sections of this city. A number of houses collapsed during the storm which raged with unprecedented violence.—*Washington Star*, November 30, 1920.

*Argentina.*—Buenos Aires, November 13.—Four persons lost their lives and severe property damage, including shipping losses, was suffered in this city as a result of a cloudburst, accompanied by a high wind this morning. Many streets and buildings were temporarily flooded.—*Washington Post*, November 15, 1920.

*New Zealand.*—Wellington, November 1.—There have been heavy floods in the Manawatu district and miles of country are under water.—*Samoa Times*, November 6, 1920.

## DETAILS OF THE WEATHER OF THE UNITED STATES.

## CYCLONES AND ANTICYCLONES.

By W. P. DAY, Observer.

*Cyclones.*—The number of low pressure areas was below the normal, due to the failure of the southward extension of the Aleutian low to deeply infect the continent.

*Anticyclones.*—The number of highs was much above the normal, the excess being accumulated by frequent invasions from the Pacific and the region of Hudson Bay.

Tables showing the relative number of highs and lows by types follow:

November, 1920.

Lows.	Al- berta.	North Pa- cific.	South Pa- cific.	Northern Rocky Moun- tain.	Colo- rado.	Tex- as.	East Gulf.	South At- lantic.	Central.	Total.
November, 1920....	4.0	0.0	1.0	0.0	2.0	1.0	0.0	2.0	0.0	10.0
Average number, 1892-1912.....	4.0	2.3	0.6	0.4	1.1	1.0	0.4	0.8	1.0	11.6

Highs.	North Pacific.	South Pacific.	Alber- ta.	Plateau and Rocky Moun- tain region.	Hudson Bay.	Total.
November, 1920.....	2.0	4.0	3.0	1.0	3.0	13.0
Average number, 1892-1912....	2.0	0.9	1.0	1.1	0.2	8.2

## THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

[Weather Bureau, Washington, Jan. 3, 1921.]

## PRESSURE AND WINDS.

For the month as a whole, pressure was above normal in all parts of the United States and Canada, save over a small area along the Pacific coast from northern California to southern Washington. The pressure was

particularly high over the Great Plains region on the 11th and 12th, and in southern and eastern districts on the following few days.

The important storms of the month were confined to the districts east of the Mississippi during the first half, but during the latter half important storms were reported from both the Atlantic and Pacific coasts.

An extensive storm area that covered the Middle West at the beginning of the month and moved to the lower St. Lawrence Valley by the 3d, was attended by general, and frequently heavy, rains over all districts from the Great Plains eastward.

On the 9th and 10th a severe storm moved from the Great Lakes to the New England States attended by high winds and rain or snow over all northern districts from the Rocky Mountains eastward.

A third severe storm developed over the Gulf States about the middle of the month and moved northward along the coast during the 16th and 17th. High winds and heavy rains prevailed over the coast districts, while farther inland, particularly over the southern Appalachian Mountain districts, rain changed to heavy sleet and farther north, in the upper Ohio and lower Lake regions, high winds and unusually heavy snows greatly delayed traffic.

About this time the first important storm of the month approached the north Pacific coast, and precipitation continued for several days in the far Northwest.

On the morning of the 20th a storm of moderate intensity had developed in the upper Mississippi Valley and during the 22d and 23d moved eastward to the middle Atlantic coast, attended by heavy rains, and local thunderstorms in portions of the Ohio Valley, and by heavy rains along the north Atlantic coast.

On the 25th another severe storm entered the far northwestern States and high winds and general precipitation prevailed for several days along the Pacific coast from northern California to Washington.

On the 27th and 28th a moderately low pressure area moved from the middle Gulf States northeastward to the Atlantic coast, attended by heavy rains, particularly in the Gulf States.

The distribution of atmospheric pressure favored high winds in the Lake region and along the north Atlantic coast on several occasions, and on the north Pacific coast on the 25th and 26th.

The prevailing winds were mainly from westerly quadrants over the districts east of the Rocky Mountains, although they were from southerly points in portions of the middle Plains. West of the Rocky Mountains they were mainly from southerly points.

#### TEMPERATURE.

The mean temperature for the month was well below normal over nearly all southern districts, and over much of the middle Rocky Mountain and Plateau regions, where locally the monthly averages were nearly  $10^{\circ}$  below the normal. In the Southern States, the middle decade was unusually cold but otherwise the temperatures were not far from normal.

The principal cold wave of the month set in over the upper Missouri Valley on the 9th and gradually extending eastward and southward gave the lowest temperatures for the month over most districts from the Rocky Mountains eastward. Minimum temperatures below zero were reported as far south as Kansas, and they fell below  $20^{\circ}$  over much of the Gulf region and to  $25^{\circ}$  in northern Florida.

The warmest periods of the month were on the 1st and 2d, from the Ohio Valley eastward, and northeastward, from the 6th to 8th over the Gulf States, and mostly about the 20th in the Central Valleys and western Mountain districts.

#### PRECIPITATION.

The month opened with rain in the great central valleys, the West Gulf States, and in the region of the Great Lakes; rain and snow in the northern portions of Minnesota, Wisconsin, Michigan, and New England, and heavy snow in the middle Rocky Mountain region, and the adjacent portions of South Dakota, Nebraska, and Wyoming. During the next two days, the storm moved to the northeastward and precipitation was received in most sections east of the Mississippi River. Toward the middle of the first decade light local rains occurred in the northern border States from the upper Lake region eastward, and during the latter part of this period precipitation occurred in the central and southern Rocky Mountain regions, and from western Texas northeastward to the upper Mississippi Valley and to the eastward, with heavy falls in parts of the lower Great Plains, and heavy local snows in Wyoming and southern Idaho. The first few days of the second decade were marked by precipitation in many central and eastern localities, which was mostly light, except for some heavy falls in the southeast. Toward the middle of the month rain or snow was quite general west of the Rocky Mountains and cloudy, unsettled weather prevailed over the eastern sections of the country, with showers in the south, and light snow in many northern localities. From the 16th to 18th a storm of considerable energy moved rapidly northeastward over the Atlantic States, and, as stated elsewhere, was attended by general and heavy rains in the coast States and by sleet or snow in the Appalachian Mountain districts, the Ohio Valley, and the lower Lake region. Generally fair weather was the rule during the last few days of the decade in most sections east of the Mississippi

River, but low pressure prevailed in the north Pacific coast districts and precipitation was frequent in the central and northern sections west of the Rocky Mountains.

Early in the third decade there was considerable precipitation in the great central valleys and to the north-eastward, and shortly after the middle of the period, scattered precipitation occurred in the Mississippi Valley and general precipitation in the eastern States. During the last few days of the month, scattered precipitation again occurred in the central valleys, but to westward of the Rocky Mountains very little precipitation was received during the latter part of the month.

For the month as a whole precipitation was light to moderate in all sections east of the Rocky Mountains, except over the Atlantic Coast States, particularly in Virginia and parts of North Carolina where the amounts averaged from 6 to nearly 8 inches, and individual stations reported in some cases the greatest amounts ever recorded in November. It was light in the lower Ohio and middle and lower Mississippi Valleys, also in the greater part of the Rocky Mountain region, and in the northwestern Great Plains, but in the eastern Great Plains the totals were above the seasonal average. Heavier precipitation than is usual for November was received in northern California, southwestern Oregon, and in portions of Nevada, Utah, and Idaho, but in the far southwest the amounts were deficient.

#### SNOWFALL.

During the last day of October and the first few days of November snow occurred over most Northern States between the Rocky Mountains and the Great Lakes, the falls being heavy in southeastern Wyoming and the western portions of Nebraska and South Dakota, but it soon disappeared under the influence of the warm weather following. Early during the second decade light snows fell in the region of the upper Lakes and in portions of the western mountains, and a little at points in north-central Texas, an unusually early date for that locality. A severe storm moving northward along the Atlantic coast from Florida to New England shortly after the middle of the month, brought a heavy blanket of snow over an extensive area from the Ohio Valley northeastward to New England. At points in western New York and Pennsylvania and over the central and western portions of Indiana and Ohio, the falls were unusually heavy for the period of the year, hindering railroad traffic and damaging transmission wires. The greater part of the snowfall for November occurred during this storm, and but little fell thereafter during the month in any portion of the country.

#### RELATIVE HUMIDITY.

Despite the absence of the usual amounts of precipitation over large portions of the country, there was a marked excess of cloudy weather, particularly in the middle and northern districts to eastward of the Rocky Mountains, and the relative humidity was generally above the average over these districts. In the middle Gulf States there was a slight average deficiency, and similar conditions prevailed from western North Dakota to the Pacific coast, except that the deficiencies were quite large in portions of Oregon and Washington.

## SEVERE STORMS.

Aside from the high winds accompanying the low pressure areas over the Great Lakes and along the north Atlantic and north Pacific coasts there were few damaging high winds.

Near Port Arthur, Tex., a severe wind storm on the 26th caused the death of one person and damaged prop-

erty to the extent of about \$100,000; and on the same date high winds at Seattle and Tacoma caused local damage to shipping, electric wires, and plate-glass windows, and high winds on the same date along the Washington coast caused the loss of two vessels and most of their crews.

## STORMS AND WARNINGS—WEATHER AND CROPS.

## STORMS AND WEATHER WARNINGS.

EDWARD H. BOWIE, Supervising Forecaster.

[Washington, Dec. 30, 1920.]

## WASHINGTON FORECAST DISTRICT.

The month from a meteorological standpoint was one of great activity, and more than the usual number of warnings of destructive winds on the Great Lakes and the seacoasts and of cold-wave and special warnings were required and issued. Moreover, the usual forecasts of the general weather and temperature conditions for a week in advance were issued each Saturday morning and distributed through the press associations and from weather bureau stations.

As has been the usual practice, heretofore, a special forecast for election day, the first Tuesday in November, was issued. This forecast was made on Monday, the 1st, and given distribution through the press associations and also telegraphed to the chairmen of the national campaign committees and to the presidential candidates. The forecasts in this particular case were accurate in practically every detail and read as follows:

A disturbance of widespread influence is central this morning over Iowa and moving east-northeastward. It has been attended during the last 24 hours by general cloudiness and rains in the Gulf States, the Great Central Valleys, the region of the Great Lakes, New England, and New York; by rains and snows in the Plains States, Minnesota, northern Wisconsin, northern Michigan, extreme northeastern New York and Maine, and snows in the Rocky Mountain region. The snowfall was heavy in parts of South Dakota, Nebraska, and Wyoming. The western disturbance will advance east-northeastward and be attended by unsettled weather and rains Tuesday—election day—in the Atlantic States, the upper Ohio Valley, and the region of the Great Lakes, with some probability of snow in northern Michigan, Wisconsin, and Minnesota. The weather will be clearing and much colder Tuesday in the Gulf States, Tennessee, and the lower Ohio and central Mississippi Valleys. Fair, cool weather will prevail Tuesday over the Plains States, the Rocky Mountain States, and all far Western States.

Special forecasts of wind and weather were prepared and dispatched each day until the 18th for the guidance of the United States naval vessels *Beaver* and *Mallard* engaged on the salvage of the United States submarine *S-5* off Delaware Breakwater. On the 19th the United States *Beaver* radiographed: "Special daily weather reports to *Beaver* and *Mallard* may be discontinued; thanks for it." It was reported that salvage operations were suspended at this time and probably would not be resumed until the coming spring, when the weather conditions would be more quiet.

On November 16 the following telegram was received from the Rayston Water Power Co., Huntingdon, Pa.: "Could you hazard a rough guess as to total precipitation, Bedford County, Pa., Monday, Tuesday, Wednesday, and Thursday this week." It appears that the available water for running this plant was so low that the question presented itself of shutting down the plant or else using coal at a greatly increased cost of operation. At this time a storm was in the Southeastern States,

and it was forecast to move northward, so that assurance could be given that general rains were probable in the immediate future. The reply to this inquiry read: "Approximately 1 inch or more precipitation, including both rain and melted snow, in Bedford County Monday to Thursday." It is reported that the actual fall measured during this period was 1.25 inch.

Special flying forecasts were issued for Army and Navy aviators, and the usual daily forecasts of weather, wind at the surface and at flying levels, for the Army, Navy, and the Post Office Aerial Mail Service routes continued throughout the month.

## STORM WARNINGS ON THE GREAT LAKES.

Northeast storm warnings were continued on the 1st on Lake Superior, northern Lake Michigan, and northern Lake Huron, in connection with a disturbance that was central at noon of that day over northern Iowa, and the evening of the same day southwest storm warnings were ordered on southern Lake Michigan, southern Lake Huron, and Lake Erie. This disturbance advanced north-eastward attended by rain and snow and strong winds and gales on the Great Lakes. The highest velocity reported was 68 miles per hour from the southwest, at Buffalo. At 10 p. m. of the 3d, southwest storm warnings were displayed on Lake Superior and at 10 a. m., on the 4th, the display was extended over Lakes Erie, Ontario, and northern and eastern Huron. The disturbance making necessary this display was central the night of the 3d near Winnipeg, and the night of the 4th, over Ontario, strong westerly winds and gales occurred as forecast.

On the 8th, at 10 p. m., when a storm was central over Minnesota, northwest storm warnings were displayed on the upper Lakes and the morning of the 9th southwest storm warnings were hoisted on the lower Lakes. The storm under consideration moved rapidly eastward across the Great Lakes attended by strong westerly winds and gales during the 9th.

Northwest storm warnings were ordered at 10 a. m. of the 11th on eastern and central Lake Superior and Lakes Michigan and Huron, and at 3 p. m. of the same day the display of northwest storm warnings was extended to Lake Erie. Strong northwest winds attended by snows occurred during the ensuing 24 hours on these Lakes.

A storm of marked intensity was central at noon of the 16th over South Carolina, and increasing in intensity and moving northward. It was expected to gain great intensity during its continued northward movement, and at 2 p. m. northeast storm warnings were ordered for Lakes Erie and Ontario and at 9:30 p. m. the display was extended west to Lake Huron. The storm acted as expected, and during the night of the 16th and during the 17th strong winds and snow occurred on these Lakes.